their scarlet and black feathers thru the winter. When brought into the normal spring condition they moulted these and they were replaced at once by others of the same color with no trace of the winter plumage which normally intervened. The writer believes that the thinness or fatness of the birds brought on by difference in nutrition and exhaustion determines the presence or absence of moulting. He secured a moult in midwinter by one of the tanagers by a suitable change. In this case the power to produce the green winter color was shown not to be lost in those that do not moult at all; but merely suppressed because there were no new feathers being formed at the time.

THE GERM-CELL CYCLE IN ANIMALS.

The term "Germ-cell Cycle" is a recognition of the fact that there is in each species a definite history whereby the germ cell of one generation is derived from a germ cell of the preceding. We have been in the habit of thinking of a cycle involving germ cells, embryo, mature body, and then more germ cells. Weismann's conception of a continuous germ plasm, from whose activity bodies spring up in what we call successive generations, has focused our attention rather upon the germ cells as furnishing the real cycle.

We have for some time known many of the points in the history of the germ cells during the stages of their maturing and union to form a new embryo. The tracing of their behavior into the new body which is formed about them is a more difficult task,—one only recently attacked with success.

The steps in this germ cell cycle are summarized by Professor Hegner as follows:

1. Fertilization or union of two germ cells to form an embryo of one cell containing the possibilities of continued germ cells and of the body that is to protect them.

2. The segmentation of this fertilized ovum and the putting aside of one or more primordial germ cells.

3. The early multiplication of these primordial germ cells.

4. A period of rest from growth and division, on the part of the germ cells, while the growth of the embryonic body is taking place. During this time the germ cells may separate into two groups and migrate to the points where the ovaries or testes are to be located.

5. Division of these primitive germ cells into the mother cells of eggs and sperm (oögonia and spermatogonia).

6. The further division and growth of the oögonia and spermatogonia to form the primary oöcytes and spermatocytes.

7. The division of the nuclear matter of oöcytes and spermatocytes so that the eggs and sperm contain only one-half the number of chromosomes characteristic of the other cells of the species. This is known as maturation.

8. Then follows fertilization, with which we started. This restores the full number of chromosomes.

The author puts most emphasis on the steps numbered 2, 3, and 4 above, since these have been least displayed in the general literature. These interesting data are brought together in a most attractive and intelligible way. The book is sure to prove very valuable to the general student of biology, who has not been able to keep in touch with recent progress in cytology. The chapter headings are as follows:

1, Introduction; 2, General Account of the Germ-Cell Cycle in Animals; 3, The Germ-Cell Cycle in the Paedogenetic Fly, *Miastor;* 4, The Segregation of the Germ Cells in Sponges, Coelenterates, and Vertebrates; 5, Segregation of the Germ Cells in the Arthropoda; 6, Segregation of the Germ Cells in Nematodes, Sagitta, and other Metazoa; 7, The Germ Cells of the Hermaphroditic Animals; 8, Keimbahn Determinants and their Significance; 9, The Chromosomes and Mitochondria of Germ Cells; 10, The Germ-plasm Theory.

There are references to the literature and an index of authors and one of subjects.

The Germ-cell Cycle in Animals. By R. W. Hegner. Illustrated. 346 pages. The Macmillan Company, New York, 1914. Price $1.75.